

IV VASCULAR PROBES

USER'S GUIDE

8/1/97

A-1882

NOT APPROVED FOR USE IN HUMANS! THESE PRODUCTS ARE DESIGNED SOLELY FOR USE IN EXPERIMENTAL ANIMALS.

Introduction

The IV Vascular Microdialysis Probe is a soft, flexible probe which, as the name implies, was primarily developed for implantation into the vascular system. However, the IV Vascular Microdialysis Probe may also be used in a variety of other tissues.

The dialysis membrane of BAS IV Probes is mounted at the distal end of a flexible cannula. Attached to the other end are 20-cm lengths of perfusate inlet and outlet lines, sheathed in a protective outer tubing. Color-coded inlet/outlet connections use standard flanged tubing connectors (MD-1510). Just above where the tubing sheath abuts the probe's flexible cannula, IV Probes have a square of flexible webbed mesh. This mesh is to be sutured to the animal's underlying connective tissue to secure the probe in place.

IV Probes with membrane lengths of 5 mm (MD-2305) or 10 mm (MD-2310) are available from BAS' inventory. These probes' flexible cannulae measure 15 mm and 10 mm, respectively, for a total cannula+membrane length of 20 mm. Contact BAS for custom sizes. Each package of IV Vascular Microdialysis Probes includes three probes and three insertion needles with split guide sleeves, which are used to introduce the probes into the vascular system. Naturally, the introducer system may also be used with other tissues where appropriate.

Jugular implantation surgery requires:

- * a good pair of surgical scissors to cut the animal's hide
- * a sharp pair of iris scissors
- * a pair of forceps (mouse-tooth style is best)
- * an approximately 14-cm large-bore needle for tunneling the inlet-outlet tubing under the animal's skin to the nape of the neck
- * veterinary tissue adhesive or sutures

If you do not have these items, they are available collectively in BAS' Surgical Instrument Kit, or individually.

Jugular Implantation Surgical Procedure

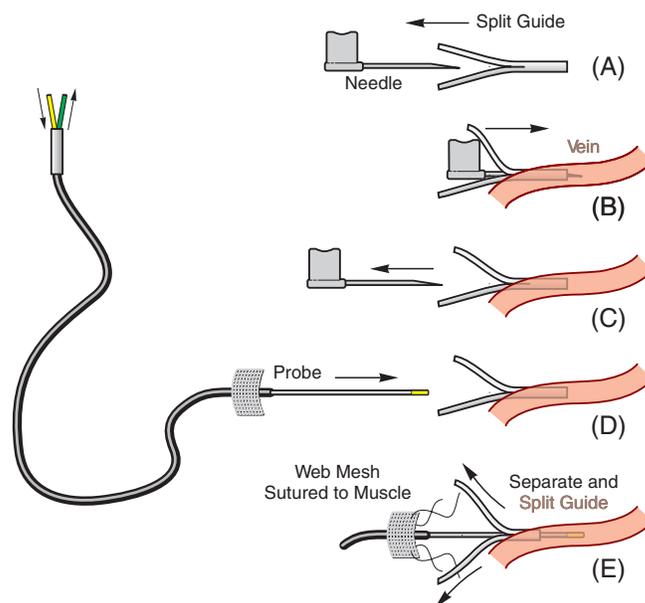
1. Anesthetize the rat. Trim the animal's fur on the underside of the neck down to the top of the chest.
2. Place the anesthetized animal on its back with its head toward you. Splay the rat's forepaws and tape them down.
3. On one side of the animal's neck, make an approximately 3-cm vertical incision in the skin over and anterior to the pectoral muscle, approximately 7 mm lateral to midline. Cut the superficially underlying fascia.

4. The fat and connective tissue surrounding the jugular must be dissected away. Do a BLUNT dissection to free the jugular of connective tissues. Free a 0.5- to 1.25-cm length of jugular from connective tissue immediately above where it tunnels under the pectoral muscle. **NOTE: Do NOT actually cut the tissue away!** you snip the connective tissue away, there is a high probability that you will accidentally cut through the jugular or its tributaries.

Extensive handling of the jugular may cause it to constrict, thus making jugular identification, dissection, and probe insertion more difficult. However, for optimal probe life, free as much of the readily accessible jugular as possible from connective tissue.

5. Create a subcutaneous "pocket" for the head of the microdialysis probe and tubing. To do so, insert a pair of closed surgical scissors or hemostats between the skin and underlying musculature at the ventral end of the skin incision. Insert the instrument tips approximately 2 cm. Open the instrument tips, blunt dissecting the skin away from the musculature.

Figure 1.



6. Thread the partially split ends of the split guide over the needle of the insertion tool (Figure 1A). Position the needle point on the pectoral muscle, approximately 3/4ths the muscle width posterior to where the jugular descends under the pectoral muscle. Insert the needle into the pectoral muscle, aiming towards the jugular vein.
7. When the needle is lined up in the pectoral muscle just posterior to the jugular, ease the needle forward into the jugular lumen. Advance the needle, inserting most of the unsplit portion of the split guide into the jugular (Figure 1B).
8. To confirm that you have penetrated into the jugular lumen, slowly begin to slip the insertion needle out of the split guide, leaving the plastic split guide in the tissue. If you see some blood following the needle tip up the split guide, your guide is in the jugular lumen.

For those not practiced, insertion may require several attempts. Note, however, that with each “stab” at inserting the needle into the jugular you may be doing increasing damage to surrounding tissue and increasing the risk of damaging the jugular. Practice on non-critical animals.

9. Gently, while holding the probe at its mesh, slip the protective sheath off the end of the probe. A slight twisting motion as you begin to withdraw the sheath may help release the probe. Since the probe membrane will be placed in a flowing stream (of blood), it is not essential to wet the membrane before inserting it. However, some investigators prefer to perform an in vitro recovery test before implanting the probe. If you wetted the probe in an in vitro test, you must continue perfusing the probe to keep the membrane from drying. (Remember, once a probe membrane has been wetted, it must be kept wet either by being in tissue or by being perfused or it will dry and cease to function.)
10. Slowly remove the insertion needle from the split guide (Figure 1C) . When the needle is out, slip the IV microdialysis probe into the split guide (Figure 1D) . Insert the IV probe deeply enough to ensure that the microdialysis membrane is fully inserted in the lumen of the jugular (Figure 1E) .
11. Suture the probe’s mesh to the underlying tissue. Ensure that the split ends of the slit introducer are not trapped in the knot. In suturing the probe to the tissue, the thread should enter the tissue either directly below the probe or slightly anterior to it so that the thread tends to pull the probe towards the jugular.
12. When the ends of the split guide are pulled apart, the guide will split down the middle, leaving only the probe in the jugular. To do this, carefully grasp both of the guide’s split cannula ends and gently pull the ends apart with a posterior upward-and-outward motion. This will tear the guide down its middle into two halves, leaving only the IV Vascular probe imbedded in the tissue.
13. If your experimental design calls for microdialysis of an awake animal, you must exteriorize the probe inlet and outlet lines. First, make a small exit incision through the skin at the nape of the neck. Insert the BAS Tubing Introducer (MR-5313) under the skin at the implant site. Tunnel the tubing introducer behind the animal’s foreleg toward the exit incision and push the tubing introducer out the exit incision.
14. Insert the ends of the probe inlet and outlet tubing into the tubing introducer and gently thread the probe tubing through the introducer until it exits the other end. Without tugging at the probe, gently pull the slack tubing through the introducer to the exit site. Withdraw the tubing introducer through the exit incision. The probe’s tubing is now exteriorized. Close the incisions with sutures or tissue adhesive, being careful not to disturb the probe.
15. While the animal is recovering from the anesthesia, you should put a “Rat Collar” or other harness on the animal, tether the animal to the BAS Return or BeeKeeper Awake Animal System, and plumb your probe inlet (yellow) and outlet (green) lines. Allow the animal to recover and begin your experiment. If you must handle your animal for injections, cage changing, etc., do so

without putting undue stress on the animal’s neck and microdialysis probe. In our hands, IV probes have remained functional for 2-6 or more days, depending in part on the thoroughness of the blunt dissection and handling stress.

Ordering Information

MD-2305	IV-5 Vascular Microdialysis Probes, 3/pkg.
MD-2310	IV-10 Vascular Microdialysis Probes, 3/pkg.
CUSTOM	Any other cannula or membrane length
CUSTOM	Other inlet/outlet tubing lengths
MD-2300	Split Guides, 10/pkg.
MR-5313	Tubing Introducer Needle
MF-5164	FEP Teflon Tubing, 0.65 mm OD x 0.12 mm ID, 1 meter (clear)
MD-1510	Flanged Tubing Connectors, 20/pkg.
MF-5371	Animal Collars, 100/pkg.
MD-1401	BAS Return Interactive Awake Animal System
MD-1575	BAS BeeKeeper Awake Animal System

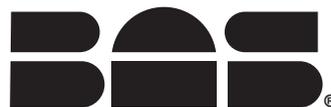
Surgical Accessories

MF-5365	Surgical Instrument Kit
MR-5314	Veterinary Bonding Glue

Limited Warranty

BAS IV Vascular Microdialysis Probes are warranted to be free from manufacturing defects and viable for a single use. Reuse of probes after insertion into tissue or repeated handling is not guaranteed since this is wholly dependent on the skill of the individual user. BAS is liable only to the extent of replacement of defective items for claims registered within 90 days of the shipping date. BAS will not be liable for any personal injury, property damage, or consequential damages of any kind arising from the use of BAS probes. This warranty does not cover damage to membranes or cannulae through improper preparation, inappropriate connections, or faulty handling by the user. The foregoing warranty is in lieu of all other warranties expressed or implied including but not limited to the implied warranties of merchantability and fitness for a particular purpose.

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